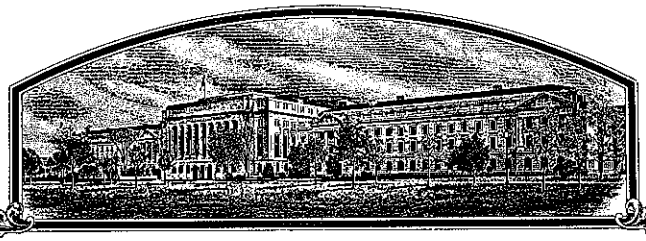


No. 9100181

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'9231'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 29th *day of* January *in the year of our Lord one thousand nine hundred and* ninety-three.

Attest:

Kenneth A. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Pioneer Hi-Bred International, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.

3. VARIETY NAME
9231

4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*
700 Capital Square
400 Locust Street
Des Moines, IA 50309

5. PHONE *(Include area code)*
515-270-3414

FOR OFFICIAL USE ONLY

PVPO NUMBER
9100181

FILING
Date: May 16, 1991
Time: ☐ A.M. ☐ P.M.

FEES RECEIVED
Filing and Examination Fee: $ 2150.-
Date: May 13, 1991
Certificate Fee: $ 250.00
Date: January 7, 1993

6. GENUS AND SPECIES NAME
Glycine max

7. FAMILY NAME *(Botanical)*
Leguminosae

8. CROP KIND NAME *(Common Name)*
Soybean

9. DATE OF DETERMINATION
July, 1984

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
Iowa

12. DATE OF INCORPORATION
1926

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

James E. Miller, Ph.D.
7301 NW 62nd Ave., P.O. Box 85
Johnston, IA 50131-0085

Michael Roth JSS 5 Feb. 1993
~~Mary Helen Mitchell (copy)~~
700 Capital Square, 400 Locust Street
Des Moines, IA 50309
PHONE *(Include area code)*:

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. ☒ Exhibit A, Origin and Breeding History of the Variety.
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety.
d. ☐ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.
f. ☒ Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office 05/15/91.
g. ☒ Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)*
☐ YES *(If "YES," answer items 16 and 17 below)* ☒ NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☐ NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
☐ YES *(If "YES," through* ☐ Plant Variety Protection Act ☐ Patent Act. Give date: _____.)
☒ NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☐ YES (If "YES," give names of countries and dates)
☒ NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
James E. Miller	Worldwide Soybean Research Director	5-8-91
SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE

9100181

Revised: 09/01/92

Attachment: 9231 Soybean (March, 1991)

Exhibit A: Variety 9231 is an F4-derived variety originating from a complex crossing scheme involving the following parents: A3127, Century, Williams 82. The F4 population from which 9231 was derived was advanced to the F4 generation by modified single-seed-descent. The F4:5 progeny rows from which 9231 was selected were grown in Iowa during the summer of 1984. It was in September, 1984, that 9231 was determined to be a stable and unique line. Subsequently, 9231 has undergone six years of extensive testing and purification, and has been observed by the breeder to be uniform and stable for all plant traits from generation-to-generation, with no evidence of variants.

Two acres of 9231 (breeders seed) were grown in 1989. Fifty acres of parent seedstock (foundation seed equivalent) were grown in 1990.

Exhibit B: Variety 9231 is most similar to 9241, A2234, A2543, Century 84, FFR253, CX298 and CX329.

Variety 9231 has tan pods which distinguishes it from both 9241 and Century 84 which have brown pods. 9231 has brown pubescence, whereas 9241 has grey pubescence. 9231 is significantly earlier than 9241 (Table 9), and 9241 is significantly earlier than Century 84 (Table 10).

Variety 9231 is significantly shorter than A2234 (Table 1) and has high peroxidase activity, whereas A2234 has low peroxidase activity. 9231 is significantly earlier than A2543 (Table 2), and is also significantly taller (Table 11). Variety 9231 is both shorter (Table 3) and earlier (Table 4) than FFR253.

Variety 9231 is not tested with CX298 due to the difference in maturity. However, variety 9231 is significantly earlier than 9273 (Table 5), which is in turn significantly earlier than CX298 (Table 6).

Variety 9231 is not tested with CX329, also due to large differences in maturity. However, variety 9231 is significantly earlier than 9293 (Table 7), which in turn is earlier than CX329 (Table 8).

The difference in maturity of 9293 and CX329 is not significant at the 0.05 level. However, variety 9231 is significantly earlier than the group II variety CX298. Given the group II variety CX298 is earlier than the group III variety CX329, variety 9231 must be earlier than CX329.

FORM APPROVED: OMB NO. 0581-0055

EXHIBIT C
(Soybean)

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

OBJECTIVE DESCRIPTION OF VARIETY
SOYBEAN (Glycine max L.)

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Pioneer Hi-Bred International, Inc.		9231

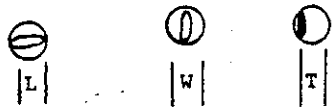
ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
700 Capital Square
400 Locust Street
Des Moines, IA 50309

FOR OFFICIAL USE ONLY
PVPO NUMBER
9100181

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g., [0][9]). Starred characters ★ are considered fundamental to an adequate soybean variety description. Other characters should be described when information is available.

1. SEED SHAPE:

[1]



1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)
2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

★ **2. SEED COAT COLOR: (Mature Seed)**

[1] 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other *(Specify)* _____

3. SEED COAT LUSTER: (Mature Hand Shelled Seed)

[1] 1 = Dull ('Corsoy 79'; 'Braxton') 2 = Shiny ('Nebsoy'; 'Gasoy 17')

★ **4. SEED SIZE: (Mature Seed)**

[1][7] Grams per 100 seeds

★ **5. HILUM COLOR: (Mature Seed)**

[6] 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other *(Specify)* _____

★ **6. COTYLEDON COLOR: (Mature Seed)**

[1] 1 = Yellow 2 = Green

★ **7. SEED PROTEIN PEROXIDASE ACTIVITY:**

[2] 1 = Low 2 = High

★ **8. SEED PROTEIN ELECTROPHORETIC BAND:**

[ ] 1 = Type A ($SP1^a$) 2 = Type B ($SP1^b$)

★ **9. HYPOCOTYL COLOR:**

[3] 1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

★ **10. LEAFLET SHAPE:**

[3] 1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other *(Specify)* _____

3

11. LEAFLET SIZE:

[2] 1 = Small ('Amsoy 71'; 'A5312') 2 = Medium ('Corsoy 79'; 'Gasoy 17')
3 = Large ('Crawford'; 'Tracy')

12. LEAF COLOR:

[3] 1 = Light Green ('Weber'; 'York') 2 = Medium Green ('Corsoy 79'; 'Braxton')
3 = Dark Green ('Gnome'; 'Tracy')

★ **13. FLOWER COLOR:**

[2] 1 = White 2 = Purple 3 = White with purple throat

★ **14. POD COLOR:**

[1] 1 = Tan 2 = Brown 3 = Black

★ **15. PLANT PUBESCENCE COLOR:**

[2] 1 = Gray 2 = Brown (Tawny)

16. PLANT TYPES:

[3] 1 = Slender ('Essex'; 'Amsoy 71') 2 = Intermediate ('Amcor'; 'Braxton')
3 = Bushy ('Gnome'; 'Govan')

★ **17. PLANT HABIT:**

[3] 1 = Determinate ('Gnome'; 'Braxton') 2 = Semi-Determinate ('Will')
3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

★ **18. MATURITY GROUP:**

[ ][5] 1 = 000 2 = 00 3 = 0 4 = I 5 = II 6 = III 7 = IV 8 = V
9 = VI 10 = VII 11 = VIII 12 = IX 13 = X

★ **19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)**

BACTERIAL DISEASES:

★ [0] Bacterial Pustule *(Xanthomonas phaseoli* var. *sojensis)*

★ [0] Bacterial Blight *(Pseudomonas glycinea)*

★ [0] Wildfire *(Pseudomonas tabaci)*

FUNGAL DISEASES:

★ [0] Brown Spot *(Septoria glycines)*

Frogeye Leaf Spot *(Cercospora sojina)*

★ [0] Race 1 [0] Race 2 [0] Race 3 [0] Race 4 [0] Race 5 [ ] Other *(Specify)* _____

[0] Target Spot *(Corynespora cassiicola)*

[0] Downy Mildew *(Peronospora trifoliorum* var. *manshurica)*

[0] Powdery Mildew *(Microsphaera diffusa)*

★ [0] Brown Stem Rot *(Cephalosporium gregatum)*

[0] Stem Canker *(Diaporthe phaseolorum* var. *caulivora)*

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

FUNGAL DISEASES: (Continued)

★ [0] Pod and Stem Blight *(Diaporthe phaseolorum* var; *sojae)*

[0] Purple Seed Stain *(Cercospora kikuchii)*

[0] Rhizoctonia Root Rot *(Rhizoctonia solani)*

Phytophthora Rot *(Phytophthora megasperma* var. *sojae)*

★ [2] Race 1 [2] Race 2 [2] Race 3 [2] Race 4 [2] Race 5 [2] Race 6 [2] Race 7

[2] Race 8 [2] Race 9 [1] Other *(Specify)* Race 19

VIRAL DISEASES:

[0] Bud Blight (Tobacco Ringspot Virus)

[0] Yellow Mosaic (Bean Yellow Mosaic Virus)

★ [0] Cowpea Mosaic (Cowpea Chlorotic Virus)

[0] Pod Mottle (Bean Pod Mottle Virus)

★ [0] Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

Soybean Cyst Nematode *(Heterodera glycines)*

★ [1] Race 1 [1] Race 2 [1] Race 3 [1] Race 4 [ ] Other *(Specify)* _____

[0] Lance Nematode *(Hoplolaimus Colombus)*

★ [0] Southern Root Knot Nematode *(Meloidogyne incognita)*

★ [0] Northern Root Knot Nematode *(Meloidogyne Hapla)*

[0] Peanut Root Knot Nematode *(Meloidogyne arenaria)*

[0] Reniform Nematode *(Rotylenchulus reniformis)*

[ ] OTHER DISEASE NOT ON FORM *(Specify):* _____

20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

★ [0] Iron Chlorosis on Calcareous Soil

[ ] Other *(Specify)* _____

21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

[0] Mexican Bean Beetle *(Epilachna varivestis)*

[0] Potato Leaf Hopper *(Empoasca fabae)*

[ ] Other *(Specify)* _____

22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	9241	Seed Coat Luster	9241
Leaf Shape	A2234	Seed Size	9241
Leaf Color	A2234	Seed Shape	9241
Leaf Size	A2234	Seedling Pigmentation	9241

23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison Data

VARIETY	NO. OF DAYS MATURITY	PLANT LODGING SCORE	CM PLANT HEIGHT	LEAFLET SIZE		SEED CONTENT		SEED SIZE G/100 SEEDS	NO. SEEDS/ POD
				CM Width	CM Length	% Protein	% Oil		
Submitted 9231	120.4	1.7	77.2			44.3	21.0	16.8	
9241 Name of Similar Variety	121.3	1.8	74.9			42.0	22.5	16.1	

PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:

1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.
2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.
3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-A_2 in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.
4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.

Table 1. Variety 9231 (X1) vs 'A2234' (X2) for height in inches.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Height was scored as the average height of the entire plot. All data was taken in 1990.

REP	X1	X2	X1-X2	(X1-X2)2
1	28	37	-9	81
2	33	35	-2	4
3	29	31	-2	4
4	25	30	-5	25
5	29	29	0	0
6	32	32	0	0
7	33	39	-6	36
8	34	35	-1	1
9	34	38	-4	16
10	31	37	-6	36
11	32	37	-5	25
12	32	33	-1	1
13	28	33	-5	25
14	28	32	-4	16
15	36	36	0	0
16	34	35	-1	1
sum	498	549	-51	271
ave	31.13	34.31	-3.19	16.9375

SD**2= 108.438/240
SD= 0.67218
D/SD= -4.742 **
DF= 15

n= 16

ave 9231 = 31.1 inches
ave A2234 = 34.3 inches

Table 2. Variety 9231 (X1) vs 'A2543' (X2) for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. All data was taken in 1990.

1	127	129	-2	4
2	128	129	-1	1
3	113	115	-2	4
4	112	116	-4	16
sum	480	489	-9	25
ave	120	122.3	-2.25	6.25

SD**2= 4.75/12
SD= 0.62915
D/SD= -3.5762 *
DF= 3

n= 4

ave 9231 = 120.0 days
ave A2543 = 122.3 days

Table 2. Variety '9231' vs variety 'A2543' for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. Data was taken in the years indicated.

1990

REP	9231 X1	A2543 X2	X1-X2	(X1-X2)**2
1	127	129	-2	4
2	128	129	-1	1
3	113	115	-2	4
4	112	116	-4	16
sum	480	489	-9	25
ave	120	122.3	-2.25	

SD**2= (25 - (9**2)/4) / 4 * 3
SD**2= 0.39583
SD= 0.62915
t = 2.25/0.62915
t = 3.5762 * significant 5% level
DF= 3

n = 4 groups of individuals

ave maturity of 9231 = 120 days
ave maturity of A2543 = 122.3 days

1991

REP	9231 X1	A2543 X2	X1-X2	(X1-X2)**2
1	112	118	-6	36
2	111	116	-5	25
3	141	142	-1	1
4	111	115	-4	16
5	108	109	-1	1
sum	583	600	-17	79
ave	116.6	120	-3.4	

SD**2= (79 - (17**2)/5) / 5 * 4
SD**2= 1.06
SD= 1.02956
t = 3.4/1.02956
t = 3.3024 * significant 5% level
DF= 4

n = 5 groups of individuals

ave maturity of 9231 = 116.6 days
ave maturity of A2543 = 120 days

Summary

REP	9231 X1	A2543 X2	X1-X2	(X1-X2)**2
1	127	129	-2	4
2	128	129	-1	1
3	113	115	-2	4
4	112	116	-4	16
5	112	118	-6	36
6	111	116	-5	25
7	141	142	-1	1
8	111	115	-4	16
9	108	109	-1	1
sum	1063	1089	-26	104
ave	118.1	121	-2.89	

SD**2= (104 - (26**2)/9)/ (9 * 8)
SD**2= 0.40123
SD= 0.63343
t = 2.89/0.63343
t = 4.5607 ** significant 1% level
DF= 8

n = 9 groups of individuals

ave maturity of 9231 = 118.1 days
ave maturity of A2543 = 121 days

Table 3. Variety 9231 (X1) vs 'FFR253' (X2) for height in inches.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Height was scored as the average height of the entire plot. All data was taken in 1990.

REP	X1	X2	X1-X2	(X1-X2)2		
1	33	42	-9	81	SD**2=	16/12
2	34	39	-5	25	SD=	1.1547
3	34	39	-5	25	D/SD=	-6.0622 **
4	31	40	-9	81	DF=	3
					n=	4
sum	132	160	-28	212	ave 9231 =	33.0 inches
ave	33	40	-7	53	ave FFR253=	40.0 inches

Table 4. Variety 9231 (X1) vs 'FFR253' (X2) for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. All data was taken in 1990.

REP	X1	X2	X1-X2	(X1-X2)2		
1	127	131	-4	16	SD**2=	11/12
2	128	130	-2	4	SD=	0.95743
3	113	119	-6	36	D/SD=	-4.7001 *
4	112	118	-6	36	DF=	3
					n=	4
sum	480	498	-18	92	ave 9231 =	120.0 days
ave	120	124.5	-4.5	23	ave FFR253 =	124.5 days

Table 5. Variety 9231 (X1) vs '9273' (X2) for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. All data was taken in 1990.

REP	X1	X2	X1-X2	(X1-X2)2
1	123	123	0	0
2	121	122	-1	1
3	111	115	-4	16
4	112	114	-2	4
5	112	115	-3	9
6	125	125	0	0
7	113	115	-2	4
8	133	138	-5	25
9	136	136	0	0
10	121	121	0	0
11	123	124	-1	1
sum	1330	1348	-18	60
ave	120.9	122.5	-1.64	5.45455

SD**2= 30.5455/110
SD= 0.52696
D/SD= -3.1053 *
DF= 10

n= 11

ave 9231 = 120.9 days
ave 9273 = 122.5 days

Table 6. '9273' (X1) vs 'CX298' (X2) for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature.

REP	X1	X2	X1-X2	(X1-X2)2
1	130	133	-3	9
2	131	135	-4	16
3	121	125	-4	16
4	119	125	-6	36
5	122	126	-4	16
6	120	125	-5	25
7	116	118	-2	4
8	114	117	-3	9
9	112	114	-2	4
10	115	117	-2	4
11	120	125	-5	25
12	121	124	-3	9
13	124	129	-5	25
14	123	130	-7	49
sum	1688	1743	-55	247
ave	120.6	124.5	-3.93	17.6429

SD**2= 30.9286/182
SD= 0.41223
D/SD= -9.5299 **
DF= 13

n= 14

ave 9273 = 120.6 days
ave CX298 = 124.5 days

Table 7. Variety 9231 (X1) vs '9293' (X2) for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. All data was taken in 1990.

REP	X1	X2	X1-X2	(X1-X2)2		
1	127	130	-3	9	SD**2=	5/12
2	128	130	-2	4	SD=	0.6455
3	113	118	-5	25	D/SD=	-5.4222 *
4	112	116	-4	16	DF=	3
					n=	4
sum	480	494	-14	54	ave 9231 = 120.0 days	
ave	120	123.5	-3.5	13.5	ave 9293 = 123.5 days	

Table 8. Variety '9293' (X1) vs 'CX329' (X2) for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. All data was taken in 1989.

REP	X1	X2	X1-X2	(X1-X2)2		
1	121	133	-12	144	SD**2=	88.8333/30
2	122	124	-2	4	SD=	1.72079
3	116	118	-2	4	D/SD=	-2.4214 NS 0.05
4	112	118	-6	36	DF=	5
5	122	124	-2	4		
6	127	128	-1	1	n=	6
sum	720	745	-25	193	ave 9293 = 120.0 days	
ave	120	124.2	-4.17	32.1667	ave CX329 = 124.2 days	

minimum t value for significance at 0.05 level = 2.571

Table 9. '9231' vs '9241' for days to maturity.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. Data was taken in 1991.

REP	9231 X1	9241 X2	X1-X2	(X1-X2)**2
1	111	116	-5	25
2	106	117	-11	121
3	108	116	-8	64
4	113	117	-4	16
5	110	116	-6	36
6	111	118	-7	49
7	112	117	-5	25
8	111	117	-6	36
9	111	117	-6	36
10	110	116	-6	36
11	112	117	-5	25
12	119	123	-4	16
13	108	112	-4	16
14	110	114	-4	16
15	109	111	-2	4
16	106	111	-5	25
17	107	110	-3	9
18	107	110	-3	9
19	130	130	0	0
20	130	130	0	0
21	118	118	0	0
22	132	132	0	0
23	108	110	-2	4
24	106	107	-1	1
25	111	121	-10	100
26	108	110	-2	4
sum	2924	3033	-109	673
ave	112.5	116.7	-4.19	

SD**2= (673 - (109**2)/26) / (26 * 25)
SD**2= 0.33237
SD= 0.57651
t = 4.19/0.57651
t = 7.2718 ** significant .1% level
DF= 25

n = 26 groups of individuals

ave maturity of 9231 = 112.5 days
ave maturity of 9241 = 116.7 days

Table 10. Variety '9241' vs variety 'Century 84' for maturity in days.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Maturity was scored as the number of days from planting until 95% of the pods in the plot were mature. Data was taken in the years specified.

1988

REP	9241 X1	Century 84 X2	X1-X2	(X1-X2)**2
1	119	121	-2	4
2	118	122	-4	16
3	131	134	-3	9
4	130	132	-2	4
sum	498	509	-11	33
ave	124.5	127.3	-2.75	

SD**2= (33 - (11**2)/4) / (4 * 3)
SD**2= 0.22917
SD= 0.47871
t = 2.75/0.47871
t = 5.7446 ** significant 1% level
DF= 3

n = 4 groups of individuals

ave maturity of 9241 = 124.5 days
ave maturity of Century 84 = 127.25 days

1990

REP	9241 X1	Century 84 X2	X1-X2	(X1-X2)**2
1	138	143	-5	25
2	137	145	-8	64
3	123	125	-2	4
4	123	125	-2	4
sum	521	538	-17	97
ave	130.3	134.5	-4.25	

SD**2= (97 - (17**2)/4) / (4 * 3)
SD**2= 2.0625
SD= 1.43614
t = 4.25/1.43614
t = 2.9593 * significant 5% level
DF= 3

n = 4 groups of individuals

ave maturity of 9241 = 130.3 days
ave maturity of Century 84 = 134.5 days

Summary

REP	9241 X1	Century 84 X2	X1-X2	(X1-X2)**2
1	119	121	-2	4
2	118	122	-4	16
3	131	134	-3	9
4	130	132	-2	4
5	138	143	-5	25
6	137	145	-8	64
7	123	125	-2	4
8	123	125	-2	4
sum	1019	1047	-28	130
ave	127.4	130.9	-3.5	

SD**2= (130 - (28**2)/8) / (8 * 7)
SD**2= 0.57143
SD= 0.75593
t = 3.5/0.75593
t = 4.6301 ** significant 1% level
DF= 7

n = 8 groups of individuals

ave maturity of 9241 = 127.4 days
ave maturity of Century 84 = 130.9 days

Table 11. Variety '9231' vs variety 'A2543' for height in inches.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Height was scored as the average height of the entire plot. Data was taken in 1991.

REP	9231 X1	A2543 X2	X1-X2	(X1-X2)**2
1	30	28	2	4
2	31	27	4	16
3	31	28	3	9
4	31	29	2	4
5	28	26	2	4
sum	151	138	13	37
ave	30.2	27.6	2.6	

SD**2= (37 - (13**2)/5) / (5 * 4)
SD**2= 0.16
SD= 0.4
t = 2.6/0.4
t = 6.5 ** significant 1% level
DF= 4

n = 5 groups of individuals

ave height of 9231 = 30.2 inches
ave height of A2543 = 27.6 inches

Exhibit E: Pioneer Hi-Bred International, Inc. has purchased sole rights to variety 9231 from originator, for which it solicits a certificate of protection. Permission was granted to file application in this manner per a telphone coversation on May 8, 1991, between Mary Helen Mitchell, Pioneer Corporate Legal Counsel, and Kenneth Evans, Commissioner, Plant Variety Protection Office.